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that which development had pursued ; also, it is not reversible — that is, an organ once lost cannot reappear, nor can a degenerate remnant again fully develop.

Regressive evolution is caused by the limitation of the means of subsistence — food, capital, or forces for work. In biology it has for its principal if not its only factors, the struggle for existence between the organs and the struggle for existence between the organisms. In sociology artificial selection plays a preponderating rôle, natural selection a secondary one. The occasional causes of regressive evolution are inutility of function, the insufficiency of nutrition or of resources, and, in biology alone, the lack of room. An institution or an organ which has ceased to be functional and has lost all utility, direct or indirect, persists, however, if one or other of the factors of atrophy, variability, or selection is not at work.

The book is written in an interesting, somewhat popular style, and is illustrated by numerous figures in the text.

ZOÖLOGY.

The Mammals of Florida.¹ — In Mr. Bangs's recent account of the mammals of peninsular Florida and the coast region of Georgia we have the first attempt at an exhaustive enumeration of the mammals of a definite geographical area from what may be termed the point of view of the new era in the history of North American mammalogy. It therefore gives a good opportunity of contrasting the new with the old in this field of research. Of papers based on large collections of mammals from restricted areas, and also of monographic reviews of particular groups, there has been no lack in recent years, but none has before attempted to treat exhaustively the mammalian fauna of a well-defined and considerable area.

It is needless to say that Mr. Bangs approaches his subject from the radical point of view of the "new school," and it is therefore of interest to contrast our knowledge of to-day, as here reflected, of the mammalian fauna of Florida with that of, say, twenty years ago. Fortunately, Mr. Bangs's "Comparative Table" of the principal previous lists of the mammals of the region under review renders

¹ Outram Bangs, *The Land Mammals of Peninsular Florida and the Coast Region of Georgia*, *Proc. Boston Soc. Nat. Hist.*, vol. xxviii, No. 7, March, 1898, pp. 157-235, with text cuts.

such comparison easy. Up to 1883 (1871-83) only 35 species were recognized from the region in question; this number is now raised by Mr. Bangs (including numerous subspecies) to 73. Five of these, however, are from the coast region of Georgia, only 68 being enumerated as Floridian.

"The coastal strip of Georgia and northern, central, and south-western Florida agrees very closely in general conformation, and also in faunal and floral characters." The general surface of the country is "flat and monotonous, with a light sandy soil and interminable forests of pine." The coast region of Georgia and northeastern Florida, south to Matanzas River, "is one continuous stretch of salt tide-marsh interlaced by deep creeks, and now and then broken by a sandy beach where some higher point of land meets the deep water." Along this coast is a series of islands, some of the larger of which, as Cumberland Island, Georgia, and Anastasia Island, Florida, and some of the Florida Keys, though separated so slightly from the mainland, appear to have developed a number of well-marked insular forms, the discovery of which has done much to increase the list of species now recognized from the general region. But aside from this, peninsular Florida, which is subinsular in position and environment, has furnished in recent years not only many new species and subspecies, but some forms so distinct from any previously known as to fairly entitle them to rank as new subgenera. The increase in the list of recognized forms is thus only in part due to the fine discriminations it is possible to make by aid of the greatly increased and vastly better condition of the material now available for study, as compared with even a decade ago, but to the thorough exploration of what appears now to have been, up to within a very few years, a very imperfectly known region, mammalogically speaking.

But this was not only the case with Florida, but with North America at large, not excluding even the long-settled parts of the eastern states. Most of the smaller mammals are chiefly nocturnal and more or less subterranean in their habits, and formerly, even as late as fifteen years ago, their capture was largely a matter of accident, and series of specimens of any but the most common species did not exist. Then, too, their preparation was so faulty as to greatly impair their value for study, and measurements taken from the animals "in the flesh," or before skinning, were rarely available. But of late all this has been changed; the trapping and preparation of small mammals have been reduced to a science, so that certain kinds of mammals it was formerly thought almost impossible to

capture, from their supposed rarity or obscure habits, can now be had in any desired numbers with a certainty and ease not dreamed of in earlier days. To this change in resources is due the recent great advance in our knowledge of North American mammals, of which Mr. Bangs's report on Floridian mammals may be taken as a fair index.

Among the more notable recent additions to the known mammalian fauna of Florida may be mentioned the large water vole, described by Mr. True in 1884 as *Neofiber alleni*, it being then considered as the type of a new genus, but now referred as a subgenus to *Microtus* (formerly *Arvicola*). Although known for several years from only two or three specimens, it was taken in considerable numbers in eastern Florida in 1889 by Mr. Chapman, who was the first to make known its interesting life history,¹ and to whose paper Mr. Bangs fails to make reference in his extended comment on the species. In view of its present known wide distribution in eastern and interior Florida, its comparatively large size and easily recognized presence, the late discovery of this species, as remarked by Mr. Bangs, is one of the strangest facts in the history of American zoölogy.

Another almost equally interesting discovery is that of the big-eared Florida deer-mouse (*Peromyscus floridanus*), described in 1889 by Mr. Chapman from a single immature specimen, and redescribed in 1890 from an adult individual by Dr. Merriam. This is the largest and biggest-eared deer-mouse of Eastern North America, and though known for some years from only two or three specimens, it has since been found to be a common species over a considerable area, and is now well represented in collections of Florida mammals.

Almost equally interesting is the white-bellied Florida deer-mouse (*Peromyscus niveiventris*), described also by Mr. Chapman in 1889, this being as much smaller than previously known deer-mice from Eastern North America as the big-eared species just mentioned was larger. It is also otherwise peculiar, and proves to belong to a group restricted to Florida, of which three species and two additional subspecies are now recognized by Mr. Bangs, one of them being insular (*P. phasma* Bangs, Anastasia Island).

There are numerous other forms worthy of note, but space will suffice only to say that to the 35 species known from this area prior to 1884, 38 species and subspecies have been added since that date, 30 of which have been described as new, all but two within the last ten years, including 16 described by Mr. Bangs in the present paper.

¹ *Bull. Am. Mus. Nat. Hist.*, vol. ii, June, 1889, pp. 120-122.

Eight species previously described, but not then known from Florida, complete the 38 additions, more than doubling the list. The names of 12 others have been changed through the recognition of the Florida phase of wide-ranging species as subspecifically distinct from the species formerly recorded as Floridian, so that the total number of new forms from Florida and the coast region of Georgia described, with two exceptions since 1888, is 42, out of a total of 73. Excepting among the bats, nearly all of the old species have been split into one or more subspecies, while the representatives of some of the genera have greatly increased. For example, *Geomys* (pocket gophers or "salamanders") has increased from 1 species to 4, with an additional subspecies; *Peromyscus* (deer-mice), from 3 species to 8 species and 3 additional subspecies.

Some of the subspecies recognized by Mr. Bangs are only very slightly differentiated local forms, so slightly that the advisability of their recognition in nomenclature is, to say the least, in some instances doubtful.

Mr. Bangs's paper is an important contribution to North American mammalogy, and is of especial value as a contribution to the faunal literature of a peculiarly instructive and interesting region.

J. A. A.

Frog Biography. — That most useful animal, the frog, has been so thoroughly discussed in such works as those of Ecker, Marshall, and Morgan, that it might seem at first sight as if there were nothing more to be said beyond the completion of anatomical and embryological details.

The first of a series of natural history notes¹ made upon Amphibia by H. Fischer-Sigwart, presents so much of interest in the life history of the frog, *Rana fusca*, that we wait eagerly for more, and, at the same time, venture to hope that some American representative of this group may soon meet with as sympathetic a biographer.

The author's observations extend over a period of some thirty years; the past ten years furnishing continuous data of times and seasons and measurements, made in the field and in his "terrarium," and now collected in tables. These and the double-page plate (the artistic merit of which must be seen to be appreciated) may be passed by to begin a brief synopsis of some of the facts recorded.

Scattered over the country, far from the water, the frogs of this species pass the summer in feeding, being most active by night and

¹ *Vierteljahrsschrift d. Naturfor. Gesell. in Zürich*, January, 1898, pp. 238-313.